

PROPOSED

Application No. 0236-02 Reviewed by: CBS

March 10, 2005

COVERED SOURCE PERMIT (CSP) NO. 0236-01-C REVIEW
APPLICATION FOR RENEWAL NO. 0236-02

Applicant: Hawaii Electric Light Company (HELCO)

Equipment:

(Shared stack)

<u>Unit No.</u>	<u>Description</u>
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S-3	7.5 MW Babcock and Wilcox Boiler, 115.9 MMBtu/hr, fired on fuel oil no. 6 and 2, contract I.D. no. FP2417, manufactured 1954.
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S-4	7.7 MW Babcock and Wilcox Boiler, 117.5 MMBtu/hr, fired on fuel oil no. 6 and 2, contract I.D. no. FP2632, manufactured 1957.
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Facility: HELCO

Shipman Generating Station

Located at: Hilo, Hawaii, UTM: 282,853 m east; 2,182,613 m north (NAD-83)

Company's Mailing Address: HELCO

Shipman Generating Station

P.O. Box 1027

Hilo, HI 96721

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Proposed Project:

The initial CSP No. 0236-01-C dated 10/11/00, permitted three (3) boilers at this facility. Due to the lack of meters or other type of monitoring device, the recordkeeping for this facility was extensive. HELCO proposed the extensive recordkeeping because Shipman was supposed to shut down in the near future and did not want to install any meters. Instead of shutting down, Shipman's usage actually went up. On 2/25/02, boiler unit no. 1 was removed from service. However, the 2002 efficiency tests and curves were not conducted for boiler unit nos. 3 and 4 and a notice of violation (NOV) docket no. 03-CA-EO-10 was issued 10/27/03. On 10/27/03, the shared stack for unit nos. 3 and 4 were extended to 83 feet high. The raised stack height lowered the potential ground level air pollutant concentrations. Thus the CSP was amended on 1/22/04 to remove most of the extensive recordkeeping conditions. Since the amendment, there has been no changes to the equipment or operation (as certified in the application).

This facility operates two (2) 'Babcock and Wilcox' boilers: a 7.5 MW (S-3) and a 7.7 MW (S-4) boiler that burns fuel oil no. 6 and no. 2 for the production of electricity for sale. The boilers create steam which provides the power to generate electricity. The fuel is stored in several on-site petroleum storage tanks. The storage tanks are considered an insignificant activity because of the insignificant air emissions due to the fuel's low vapor pressure. The standard industrial classification code (SICC) for this facility is 4911 - Electric Services.

Since this facility is a major source, a covered source permit is required for the two boilers.

This facility is located near Hilo Bay (adjacent to the golf course), on the island of Hawaii, and has a base elevation of approximately 12' above sea level. The terrain is flat in the surrounding area of the facility.

This facility is a major covered source based on the annual emissions of criteria pollutants (specifically NO_x, SO₂, and PM) exceeding 100 tons per year for each individual pollutant. Cumulative Hazardous Air Pollutant (HAP) emissions are less than 25 tons per year and no single HAP exceeds 10 tons per year.

This permit review is based on the application and its revisions dated 5/7/2004. A check for \$3,000.00 has been processed for a Renewal to a Major Covered Source Permit Application.

Air Pollution Controls:

None of the equipment at this facility use "add-on" air pollution control devices.

Applicable Requirements:

Hawaii Administrative Rules (HAR)

- Chapter 11-59, Ambient Air Quality Standards
- Chapter 11-60.1 Air Pollution Control
 - Subchapter 1, General Requirements
 - Subchapter 2, General Prohibitions
 - 11-60.1-31 Applicability
 - 11-60.1-32 Visible Emissions
 - 11-60.1-38 Sulfur Oxides From Fuel Combustion
 - Subchapter 5, Covered Sources
 - Subchapter 6, Fees for Covered Sources, Noncovered sources, and Agricultural Burning
 - 11-60.1-111 Definitions
 - 11-60.1-112 General Fee Provisions for Covered Sources
 - 11-60.1-113 Application Fees for Covered Sources
 - 11-60.1-114 Annual Fees for Covered Sources
 - 11-60.1-115 Basis of Annual Fees for Covered Sources

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Consolidated Emissions Reporting Rule (CERR) reporting since the facility has potential emissions ≥ 100 tpy for nitrogen oxides (NO_x) and sulfur dioxide (SO_2), pursuant to Table 1 of 40 CFR Part 51, Subpart A. This is a Type B source since the potential emissions is less than the next threshold.

This is a major source since the facility has potential emissions ≥ 100 tpy for NO_x and SO_2 .

Non-Applicable Requirements:

Code of Federal Regulations (CFR)

40 CFR 52.21 - Prevention of Significant Deterioration of Air Quality (PSD) since the boilers were installed prior to promulgation of PSD and there are no new major sources and no new modifications.

40 CFR Part 61 and 63 - National Emission Standard for Hazardous Air Pollutants (NESHAPS) and Maximum Achievable Control Technology (MACT) since there is no specific source category for boilers and the facility is not a major source of HAP emissions.

40 CFR Part 60 - New Source Performance Standard (NSPS), specifically D-Dc and Kb since the boilers were installed prior to promulgation of NSPS and all of the petroleum storage tanks store fuel with true vapor pressures less than 3.5 kPa.

Compliance Assurance Monitoring (CAM) is to provide a reasonable assurance that compliance is being achieved with large emissions units that rely on air pollution control device equipment to meet an emissions limit or standard. Pursuant to 40 CFR, Part 64, for CAM to be applicable, the emissions unit must: (1) be located at a major source; (2) be subject to an emissions limit or standard; (3) use a control device to achieve compliance; (4) have potential precontrol emissions that are greater than the major source level [>100 tpy]; and (5) not otherwise be exempt from CAM. CAM is not applicable to the boilers since items 2, 3, and 5 do not apply.

A Best Available Control Technology (BACT) analysis was not required since this is an existing source and there is no new construction or major modification.

This is not a synthetic minor source because it is a major source.

Insignificant Activities/Exemptions:

Insignificant activities based on size, emission level, or production rate, are as follows (taken from the CSP application):

<u>Basis for Exemption</u>	<u>Description</u>
HAR §11-60.1-82(f)(1)	There are two (2) fuel oil and one (1) propane storage tanks which are exempt due to the size of the tanks and low vapor pressure of the fuel they store.

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|-----------------------|---|
| HAR §11-60.1-82(f)(2) | There occasionally may be fuel burning equipment with a heat input capacity less than one MMBtu/hr. |
| HAR §11-60.1-82(f)(6) | Paint is used occasionally for maintenance purposes. |
| HAR §11-60.1-82(f)(7) | There are fugitive equipment leaks from valves, flanges, pump seals and oil/water separators; and solvents are used for maintenance purposes. |

Insignificant activities in addition to those listed in subsection (f) are:

<u>Basis for Exemption</u>	<u>Description</u>
HAR §11-60.1-82(g)(1)	There is occasional welding for maintenance purposes.
HAR §11-60.1-82(g)(2)	Several types of hand held equipment are used for maintenance and testing purposes.
HAR §11-60.1-82(g)(3)	Laboratory equipment are used for chemical and physical analyses.
HAR §11-60.1-82(g)(8)	Industrial equipment less than 25 HP are used for maintenance.
HAR §11-60.1-82(g)(9)	There are many maintenance activities that fall under this category.
HAR §11-60.1-82(g)(12)	There are stacks and vents for plumbing purposes.
HAR §11-60.1-82(g)(13)	Office equipment and products are used at this facility.
HAR §11-60.1-82(g)(14)	There are minor wood working activities at this facility.

Project Emissions:

There are no changes since the permit amendment dated 1/22/04. However, the potential facility emissions decreased from the initial CSP with the removal of Unit No. S-1. The same emission factors and calculations were copied from the initial CSP as follows:

1. Emission rates for NO_x and PM₁₀ were based on an evaluation of AP-42 Section 1.3-8, 10/96 and calculations for fuel oil no. 6 (more conservative than fuel oil no. 2);
2. CO and VOC emission rates were given an assumed emissions factor (EF) based on a previous stack test data. The assumed EF were more conservative than AP-42;

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3. SO₂ emission rates were based on mass balance using sulfur content and heating value of the fuel; and
4. HAPs emission rates were determined by using EPRI PISCES Air Toxic Database and 1994 Waiau 7 test data.

Hourly emission rates are maximum potential and annual emission rates are based on operating 8,760 hr/yr, although operations will most likely be much less based on previous records. A summary of the individual unit criteria pollutant emissions is shown in **TABLES 1 to 5**.

TABLE 1
NO_x EMISSIONS

Unit No.	AP-42 EF (lb/MMBtu)	Heat Input (MMBtu/hr)	Emission Rate (lb/hr)	Emission Rate (ton/yr)
S-3	0.444	115.9	51.46	225
S-4	0.444	117.5	52.17	229

TABLE 2
SO₂ EMISSIONS

Unit No.	Assumed EF ¹ (lb/MMBtu)	Heat Input (MMBtu/hr)	Emission Rate ² (lb/hr)	Emission Rate ² (ton/yr)
S-3	2.20	115.9	254.98	1117
S-4	2.20	117.5	258.50	1132

1. Emission factors based on fuel oil no. 6 with a mass sulfur balance of 2% sulfur by weight.
2. The emission rates assumed operating at max. potential for 8,760 hr/yr, but actual operations may be limited (see **Air Quality Assessment**).

TABLE 3
CO EMISSIONS

Unit No.	AP-42 EF (lb/MMBtu)	Assumed EF (lb/MMBtu)	Heat Input (MMBtu/hr)	Emission Rate (lb/hr)	Emission Rate (ton/yr)
S-3	0.033	0.066	115.9	7.65	34
S-4	0.033	0.066	117.5	7.76	34

Assumed EF was provided by the applicant; AP-42 may under estimate the emission rate.

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TABLE 4
PM/PM₁₀/PM_{2.5} EMISSIONS

Unit No.	AP-42 EF (lb/MMBtu)	Heat Input (MMBtu/hr)	Emission Rate (lb/hr)	Emission Rate (ton/yr)
S-3	0.144	115.9	16.69	73
S-4	0.144	117.5	16.92	74

Assumed PM = PM₁₀ = PM_{2.5} as a worst case scenario.

TABLE 5
VOC EMISSIONS

Unit No.	AP-42 EF (lb/MMBtu)	Assumed EF (lb/MMBtu)	Heat Input (MMBtu/hr)	Emission Rate (lb/hr)	Emission Rate (ton/yr)
S-3	0.005	0.020	115.9	2.32	10
S-4	0.005	0.020	117.5	2.35	10

Assumed EF was provided by the applicant; AP-42 may underestimate the emission rate.

The maximum potential of total HAPs emissions for all two boilers is 1.25 tpy and each boiler's maximum potential of HAPs emissions is less than 1 tpy (see application for details).

Ambient Air Quality Assessment (AAQA):

A new AAQA was not conducted since the AAQA in the previous permit review included this scenario. SO₂ was the only air pollutant that would exceed an ambient air standard, therefore several scenarios were modeled. Scenario 3 included the situation for this permit review - extended stack to 80' high and S-3 and 4 operating simultaneously and continuously. **TABLE 8** shows the stack parameters used and **TABLE 9** shows the concentrations in comparison to the state and national ambient air quality standards (SAAQS and NAAQS).

NO₂, CO, and PM₁₀ were modeled separately and included the worst case scenario of having all three boilers (including S-1) operating simultaneously and continuously. Since this model was conservative, a new model was not conducted for this review. **TABLE 6** shows the stack parameters used and **TABLE 7** shows the concentrations in comparison to SAAQS and NAAQS.

See permit review dated 10/11/00 for AAQA details.

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TABLE 6
SOURCE EMISSION RATES AND STACK PARAMETERS FOR NO₂, CO, PM₁₀

SOURCE		EMISSION RATES ^{1,2}					STACK PARAMETERS			
Equipment	Stack No.	SO ₂ (g/s)	NO _x (g/s)	CO (g/s)	PM ₁₀ (g/s)	Pb (g/s)	Height (m)	Temp. (K)	Velocity (m/s)	Diameter (m)
4 MW Boiler (S-1)	1	--	3.16	0.573	1.25	--	21.34	489	7.54	1.52
7.5 MW Boiler (S-3)	2	--	6.48	0.964	2.10	--	21.34	451	15.37	1.905
7.7 MW Boiler (S-4)	2	--	6.57	0.978	2.13	--	21.34	451	15.37	1.905

1. SO₂ was not modeled for this run.

2. Pb emissions are expected to be negligible.

TABLE 7
PREDICTED AMBIENT AIR QUALITY IMPACTS FOR NO₂, CO, PM₁₀

Air Pollutant	Averaging Time	Impact (µg/m ³)	Background ¹ (µg/m ³)	Total Impact (µg/m ³)	SAAQS (µg/m ³)	Percent Standard	Impact Location (m,m) ²
SO ₂	3-Hour ³	--	--	0	1300	--	--
	24-Hour ³	--	--	0	365	--	--
	Annual ³	--	--	0	80	--	--
NO ₂	Annual ⁴	49.9	--	50	70	71.29%	282900, 2182650
CO	1-Hour	218.1	--	218	10000	2.18%	282900, 2182650
	8-Hour	95.7	--	96	5000	1.91%	282800, 2182650
PM ₁₀	24-Hour	83.6	--	84	150	55.73%	282800, 2182650
	Annual	19.8	--	20	50	39.60%	282900, 2182650

1. Background concentrations are not required for this facility.

2. (m,m) = Location (UTM coordinates) meters east, meters north.

3. SO₂ was not modeled for this run.

4. NO₂ = NO_x concentrations.

5. Pb and H₂S emissions were assumed to be negligible.

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TABLE 8
SOURCE EMISSION RATES AND STACK PARAMETERS FOR SO₂

SOURCE		EMISSION RATES ^{1, 2}					STACK PARAMETERS ¹			
Equipment	Stack No.	SO ₂ (g/s)	NO _x (g/s)	CO (g/s)	PM ₁₀ (g/s)		Height (m)	Temp. (K)	Velocity (m/s)	Diameter (m)
4 MW Boiler (S-1) ³	1	--	--	--	--		--	--	--	--
7.5 & 7.7 MW Boilers (S-3 & S-4)	2	64.78	--	--	--		24.38	451.0	15.37	1.905

Note:

1. The listed information for stack no. 2 includes the emissions rates and stack parameters for the combined units S-3 and S-4.
2. NO₂, CO, and PM₁₀ were not modeled for this run.
3. S-1 would be shut down for scenario 3.

TABLE 9
PREDICTED AMBIENT AIR QUALITY IMPACTS FOR SO₂

Air Pollutant	Averaging Time	Impact (µg/m ³)	Background ¹ (µg/m ³)	Total Impact (µg/m ³)	SAAQS (µg/m ³)	Percent Standard	Impact Location (m,m) ²
SO ₂	3-Hour	1047.4	--	1047	1300	80.57%	282900, 2182450
	24-Hour	348.1	--	348	365	95.37%	282800, 2182350
	Annual	15.2	--	15	80	19.00%	282400, 2181300

Note:

1. Background concentrations are not required for this facility.
2. (m,m) = Location (UTM coordinates) meters east, meters north.

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Other Issues:

1. The applicant had proposed four (4) additional alternate operating scenarios (AOS) which were not considered AOS by the Department of Health. The following were considered facility maintenance: 1) “.. unit operation during start-up, shutdown, maintenance and testing..” 2) “.. unpredictable periods of equipment failure, upsets, or emergency conditions..” 3) “.. fuel additives and other products..” 4) “.. boiler soot-blowing..”
2. A site inspection was conducted on 2/4/05 by Corey Shibata and Ed Yamamoto of DOH; and Bruce Schleiman and Don Heinzen of HELCO. The stack, boilers, and fuel storage tanks were verified to be as permitted. S-1 and S-2 were still in place, but partially dismantled, removed from service, and not connected to any stack. The history of those two boilers is that they were originally used to power a ship. These boilers will never be used because they are very inefficient for very little power by today's standards. The overall facility was upgraded including new paint, windows, and fencing. A camera was installed to monitor the stack opacity without having to go outside. This is not considered a continuous opacity monitoring system (COMS) and there is no requirement for COMS at this facility. S-3 was recently overhauled, but was damaged at the time of inspection and S-4 was in the process of being overhauled. Normally, the boilers are overhauled every ten (10) years.

Existing Permit Conditions:

1. Standard boiler conditions with opacity limit less than 40% because of the boilers' construction date.
2. The following alternate operating scenario (AOS) was proposed by the permittee in the CSP application and was a condition in the previous CSP:

The ability to switch fuels, excluding used oil. The permittee is required to submit fuel information for Department of Health approval.

Conclusion and Recommendation:

In conclusion, it is the Department of Health's preliminary determination that the facility will comply with all State and Federal laws, rules, regulations, and standards with regards to air pollution. Therefore, a renewal for CSP No. 0236-01-C for HELCO - Shipman Generating Station is recommended based on the information provided in the air permit application and subject to the following:

1. Above special permit conditions;
2. 30-day public review period; and
3. 45-day EPA review period.